551.590.2

## SOLAR OBSERVATIONS

## SOLAR AND SKY RADIATION MEASUREMENTS DURING OCTOBER, 1929

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures, and an account of the method of obtaining and reducing the measurements, the reader is referred to the Review for January, 1929, 57: 26.

Table 1 shows that solar radiation intensities averaged below the normal values for October at Madison, Wis., and Lincoln, Nebr., and close to normal at Washington, D. C.

Table 2 shows an excess in the total solar radiation (direct+diffuse) received on a horizontal surface at Washington, close to normal at Madison, and a deficiency at Lincoln, Chicago, and New York.

Skylight polarization measurements obtained on nine days at Washington give a mean of 53 per cent and a maximum of 66 per cent on the 17th. At Madison, measurements obtained on seven days give a mean of 60 per cent, with a maximum of 70 per cent on the 17th. The mean values obtained at the two stations are below their respective October normals, but their maximum values are close to their respective average maxima.

Table 1.—Solar radiation intensities during October, 1929
[Gram-calories per minute per square centimeter of normal surface]

Washington, D. C.

			w	ashing	ton, D	. с.							
Sun's zenith distance													
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	Noon		
Date	75th mer. time				A	ir mas	ss				Local		
2400		<u> </u>	1										
			۸.	М.			Р. М.				solar time		
	e.	5.0	4.0	3.0	2.0	1 1.0	2.0	3.0	4.0	5.0	e.		
Oct. 8	mm. 6. 27	cal. 0.57	cal. 0.76	cal. 0.96	cal. 1.18	cal. 1.45	cal.	cal.	cal.	cal.	mm, 4.57		
Oct. 9	4.95					1.00		0. 69	0.48		4, 17		
Oct. 11	5.79	0.66		0 86	1 07			- <b>-</b>			4. 75 7. 87		
Oct. 12 Oct. 16	6. 76	0. 51	0. 76	0.92							7. 57		
Oct. 17	6.02	0.78	0.86	0.90			1.18	1.12		0.84	3.99		
Oct. 18 Oct. 19		0. 90 0. 79				1. 46	1. 14	0. 95 0. 87		0.76	3. 45 3. 15		
Oct. 23	7. 29	0.89	0.98	1.05	1.19		1. 18	0.98		0.65	6. 50		
Oct. 24	6.76	0.57			1.06	;-;;	1.00				4.37 3.30		
Oct. 26 Oct, 28			0. 90 0. 92			1. 51	1. 20	1. 03	0.89		4.95		
Means	1	0. 72			1	1. 36	1. 10	0. 94	0. 77	0. 75			
Departures			±0.00				-0. 01			+0.05			
Madison, Wis.											4, 57		
Oct. 2	6. 50				1.02						6.76		
Oct. 5	5. 16 6. 27		0.83 0.82	1.00 0.91		1. 39					7.04 5.16		
Oct. 8			0. 71	0. 85		1.34					4. 17		
Oct. 14	6.02		0.89	1.04		1.34	1.18	l			6.02		
Oct. 15	7. 04 8. 81			0.88		1. 46	1.23				10. 21 6. 27		
Oct. 17	6. 27	0.80			1. 16		1. 23				4.75		
Oct. 18											5.79		
Oct. 21				0. 93	1. 44						5. 36 4. 37		
Oct. 25				1.04							5.16		
Means Departures			0. 89 -0. 13	0. 96 -0. 09	1. 17 0. 02	1. 38 -0. 02	1. 21 +0. 02						
Lincoln, Nebr.											!		
Oct. 5	9.14						1	Ĭ	0.84	0. 71	9.83		
Oct. 7	6.76					1. 39			0.77		7.87		
Oct. 12			0. 98	1.10	1. 27	1. 44					6. 02 8. 81		
Oct. 13 Oct. 14	9.47		0. 74	0. 90			1. 22 1. 17	0. 99 1. 02	0.92		12. 24		
Oct. 16	. 10. 59		0.99	1.12	1. 29	1.50	1. 26	1.06	0.93	0.81	10. 21		
Oct. 17 Oct. 24	7.04		0.89	1.05 1.12		1. 41	1.13	0. 93	0.77	0.66	9. 83 5. 36		
Oct. 25	4.17			1.17			1. 33	1. 20	1. 08	0. 94	4. 95		
Oct. 26	4. 17	0. 59	0.72	1.03			1. 30	1.09	0.98	0.80			
Means Departures			0. 86 0. 08			1. 44 0. 04		1. 02 -0. 06		0. 78 -0. 05			
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Extrapolated.

Table 2.—Solar and sky radiation received on a horizontal surface
[Gram-calories per square centimeter of horizontal surface]

	Average daily radiation								A verage daily departure from normal					
Week be- ginning	Washington	Madison	Lineoln	Chicago	New York	Twin Falls	Fresno	La Jolla	Washington	Madison	Lineoln	Chicago	New York	
1929 Oet. 1	cal. 252 402 308 272	323 189 245			cal. 150 247 221 180	407 349	432 388	cal. 374 293 217 281	cal. -69 +100 +34 +8	cal. +51 -58 +22 -17	cal. -24 -94 -17 +18	cal. +22 -42 +25 -39	cal. -97 ±0 +23	
Excess or defi-	cienc	y sit	ice fi	rst o	f yea	r on	Oct	28.	+6,300	-553	-4,122	-686	-5, 943	

## POSITIONS AND AREAS OF SUN SPOTS

Communicated by Capt. C. S. Freeman, Superintendent U. S. Naval Observatory. Data furnished by Naval Observatory, in cooperation with Harvard, Yerkes, and Mount Wilson Observatories. The differences of longitude are measured from central meridian, positive west. The north latitudes are plus. Areas are corrected for foreshortening and are expressed in millionths of sun's visible hemisphere. The total area, including spots and groups, is given for each day in the last column!

	Eastern	н	eliograph	nie	At	Total area	
Date	standard civil time	Diff. long.	Longi- tude	Lati- tude	Spot	Group	for each day
1929 Oct. 1 (Mount Wilson)	h. m. 12 45	-45.0 +15.0 +52.0	219. 5 279. 5 316. 5	+10.0 +11.0 +14.0		185 254 11	450
Oct. 1 (Yerkes)	9 56	-50. 5 -47. 3 -44. 8 -43. 3 -39. 3 +8. 8 +9. 6 +10. 2 +11. 2 +16. 2 +20. 1 +52. 2	215. 6 218. 8 221. 3 222. 8 226. 8 274. 9 275. 7 276. 3 276. 9 277. 3 286. 2 318. 3	+12.8 +10.5 +11.3 +9.9 +10.8 +8.7 +10.2 +10.1 +10.0 +12.3 +10.4 +10.5 +12.9	24 17 27 20 20 31 97 14	133 121 54 141 173	872
Oct. 2 (Mount Wilson)	13 15	-30.0 +30.0 +68.0	221. 0 281. 0 319. 0	+11.0 +12.0 +15.0		248 216 22	486
Oct. 2 (Yerkes)	15 37	-36. 2 -33. 2 -28. 6 -25. 7 -22. 8 +23. 8 +24. 9 +34. 1 +36. 0 +67. 0	213. 5 216. 5 221. 1 224. 0 226. 9 273. 5 274. 6 278. 6 283. 8 285. 7 316. 7	+13. 1 +10. 3 +10. 7 +11. 5 +11. 0 +9. 4 +10. 7 +10. 7 +11. 0 +11. 7 +13. 2	16 	106 377 147 215	1, 262
Oct. 3. (Naval Observatory).	10 38	-52. 0 -25. 5 -15. 0 +42. 0 +79. 0	187. 3 213. 8 224. 3 281. 3 318. 3	+13. 5 +12. 0 +10. 5 +10. 5 +12. 5		15 62 340 185 62	684
Oct. 4 (Naval Observatory).	11 44	-38, 0 -12, 0 -1, 0 +57, 0	187. 5 213. 5 224. 5 282. 5	+12.5 +12.5 +10.0 +10.5	6	46 370 154	576
Oct. 5 (Naval Observatory).	12 13	$ \begin{array}{r} -38.0 \\ -24.0 \\ +2.0 \\ +13.0 \\ +70.5 \end{array} $	174, 0 188, 0 214, 0 225, 0 282, 5	-5.0 +13.0 +13.0 +10.0 +11.0		22 31 18 401 154	626
Oct. 6 (Naval Observatory).	10 31	$\begin{array}{c c} -55.0 \\ -31.0 \\ -12.5 \\ +26.0 \\ +83.0 \end{array}$	144. 8 168. 8 187. 3 225. 8 282. 8	-19. 5 -8. 0 +13. 5 +10. 5 +11. 5	6	55 52 386 139	638
Oct. 7 (Naval Observatory).	10 44	$ \begin{array}{r rrrr} -76.0 \\ -73.0 \\ -42.5 \\ +2.0 \\ +39.5 \end{array} $	110. 5 113. 5 144. 0 188. 5 226. 0	-10.5 +5.0 -18.5 +14.0 +11.0	324	46 62 25 417	874
Oct. 8 (Naval Observatory).	10 52	$ \begin{vmatrix} -62.5 \\ -57.5 \\ -30.0 \\ +16.0 \\ +55.0 \end{vmatrix} $	110. 7 115. 7 143. 2 189. 2 228, 2	$\begin{array}{c c} -10.5 \\ +4.5 \\ -20.0 \\ +13.5 \\ +11.5 \end{array}$	340	139 170 12 482	1, 093